secondary maxima can be greatly reduced if not indeed eliminated. A modification of the detection characteristics or of the illumination and detection characteristics can also result in a diminution of the detected contributions from the secondary maxima. As a result of a diminution in the secondary maxima, the reconstruction methods can be successfully applied and ideally can even be dispensed with.

Therefore, at least one optical component is arranged in the beam path of the double confocal scanning microscope; the optical component can be provided in either the illuminating beam path or the detection beam path, or in the illuminating and detection beam paths. If an optical component is arranged only in the illuminating beam path, only the characteristics of the double confocal illumination are thereby modified. Arranging the optical component only in the detection beam path correspondingly modifies the characteristics of the double confocal detection. Arranging the optical component in the illuminating and detection beam paths affects the characteristics of the double confocal illumination and detection. The optical component is configured in such a way that it influences the amplitude and/or phase and/or polarization of the light, specifically of the light that interacts with the optical component. The interaction is understood to be, for example, a transmission, a reflection, or a combination of transmission and reflection (for example in the case of an optical component of partially reflective configuration).

## Detailed Description of the Invention

Please replace paragraph [0038] with the following rewritten paragraph:

FIG. 3 shows, in a diagram, the normalized intensity of the illumination PSF of the double confocal scanning microscope of FIG. 1, but without the use of the two optical components 24, 25. The diagram shows the normalized intensity of the illuminating light as a function of the local coordinate along optical axis 27 (drawn with dashed lines in FIG. 1) in the focus region of the two microscope objectives 18, 19. The principal maximum of the illumination PSF, which has a normalized intensity value of 1, is visible at the Z coordinate 300. The first two secondary maxima, which have normalized intensity values of approximately 0.5, are visible to the left and right of the principal maximum. The shape of the double confocal illumination PSF and/or detection PSF can be modified by the optical component 24 or 25. Provision is made in this

A2 cont'd

context, in particular, for the shape of the axially arranged secondary maxima of the double confocal illumination PSF and/or detection PSF to be modified in controlled fashion; modification of the principal maximum is also conceivable. In the event that operation of the double confocal scanning microscope is directed toward the presence of destructive interference, the optical component 24 or 25 could also modify the shape of the two principal maxima resulting from the destructive interference. In particularly preferred fashion, the optical component is configured in such a way that by means of its utilization, the intensity of the secondary maxima of the illumination PSF and/or detection PSF can be diminished. As a result, in particularly advantageous fashion, the detected contributions brought about by the secondary maxima of the illumination PSF and/or detection PSF can be similarly diminished.

Please add the following paragraphs after paragraph [0045] in the "Detailed Description of the Invention" section:

A3

In very particularly preferred fashion, provision is made for the secondary maxima of the illumination PSF and the detection PSF to be located, as a result of the optical component 24 and 25 , at different positions. Because, in double confocal scanning microscopy as in confocal scanning microscopy, the overall PSF is defined by the product of the illumination PSF and the detection PSF, the intensity of the secondary maxima of the overall PSF can be reduced or minimized by the fact that the principal maxima of the illumination PSF and detection PSF are located in the same position, but the secondary maxima of the illumination PSF and detection PSF are located at different positions. Creation of the product thus causes only the principal maximum, but not the secondary maxima, to exhibit a high intensity value. Since the secondary maxima are arranged, in double confocal scanning microscopy, in particular along the optical axis (i.e. in the axial direction), the secondary maxima of the illumination PSF and detection PSF can be diminished in intensity if, in particular, the secondary maxima are located at different axial positions.

In a particularly preferred embodiment, several optical components 24 and 25 (see Fig. 1 and 2) are provided for influencing the amplitude and/or phase and/or polarization of the light. For example, the optical component 24 and 25 arranged in the one beam path segment 14 of the double confocal scanning microscope could be different from that in the other beam path segment 15. Furthermore, an optical component different from that in the illuminating beam path 1 could be provided in the detection beam path 3. Lastly, in such cases the optical components are to be configured in such a way that the characteristics of the double confocal illumination and/or detection are optimized in terms of signal yield and minimization of image artifacts.

A3 Cont'd

In order to modify the characteristics of the double confocal illumination and/or detection, provision is made for the optical component to modulate the wave front of the illuminating light and/or the detected light. This can be a temporal and/or spatial modulation, although a spatial modulation is preferred. It would be conceivable, for example, when two optical components are used, for the spatial modulation of the light brought about by the components to be variable over time. In particular, provision could then be made for a specimen to be imaged twice with the double confocal scanning microscope according to the present invention, the modulation of the two optical components being configured exactly oppositely in each case for the second specimen detection, so that an optimum specimen data set can be extracted computationally from the two detected specimen data sets.

In particularly preferred fashion, the optical component 24, 25 is arranged in a microscope objective pupil. Because of the poor accessibility of the pupil plane of a microscope objective, which generally is located in the objective itself, a plane optically conjugated with the pupil plane is preferably selected as the filter location. With such an arrangement, the design and configuration of the optical components can more easily be calculated. The reason for this is that

if the optical components influencing the light are arranged in the microscope objective pupil or in a plane optically conjugated therewith, it is possible to utilize the methods of Fourier optics. Of course it is also possible to arrange the optical component at any desired location in the illuminating and/or detection beam path, but in such a case a possibly more complex calculation of the optical component is necessary.

A3 cont.d

Concretely, an amplitude filter and/or phase filter could be provided as the optical component 24, 25. Said filter correspondingly influences the amplitude and/or phase of the light. Provision is made for the filter to exhibit different amplitude or phase properties perpendicular to the optical axis. Retardation plates and/or phase plates can furthermore serve as optical components.

An LCD (liquid crystal device) arrangement could be provided as the optical component. The use of LCD arrangements makes possible, in particularly advantageous fashion, a flexible and variable configuration of the optical component. If a color LCD arrangement is used, light of individual wavelengths or individual wavelength regions can, in particularly advantageous fashion, be selectively influenced.

Partially amplitude-modifying elements can furthermore serve as optical components. This can be, in particular, a neutral density filter that exhibits locally different filter properties.

It is conceivable in very general terms for other elements that modify the wave front of the illuminating or detected light to be provided as the optical component. For example, it may be mentioned at this juncture that an adaptive optical system could be provided as the optical component. This could be, concretely, a deformable mirror. The deformable mirror could, for example, be configured in such a way that piezoelements which can individually be differently